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INSTALLATION RESTORATION PROGRAM

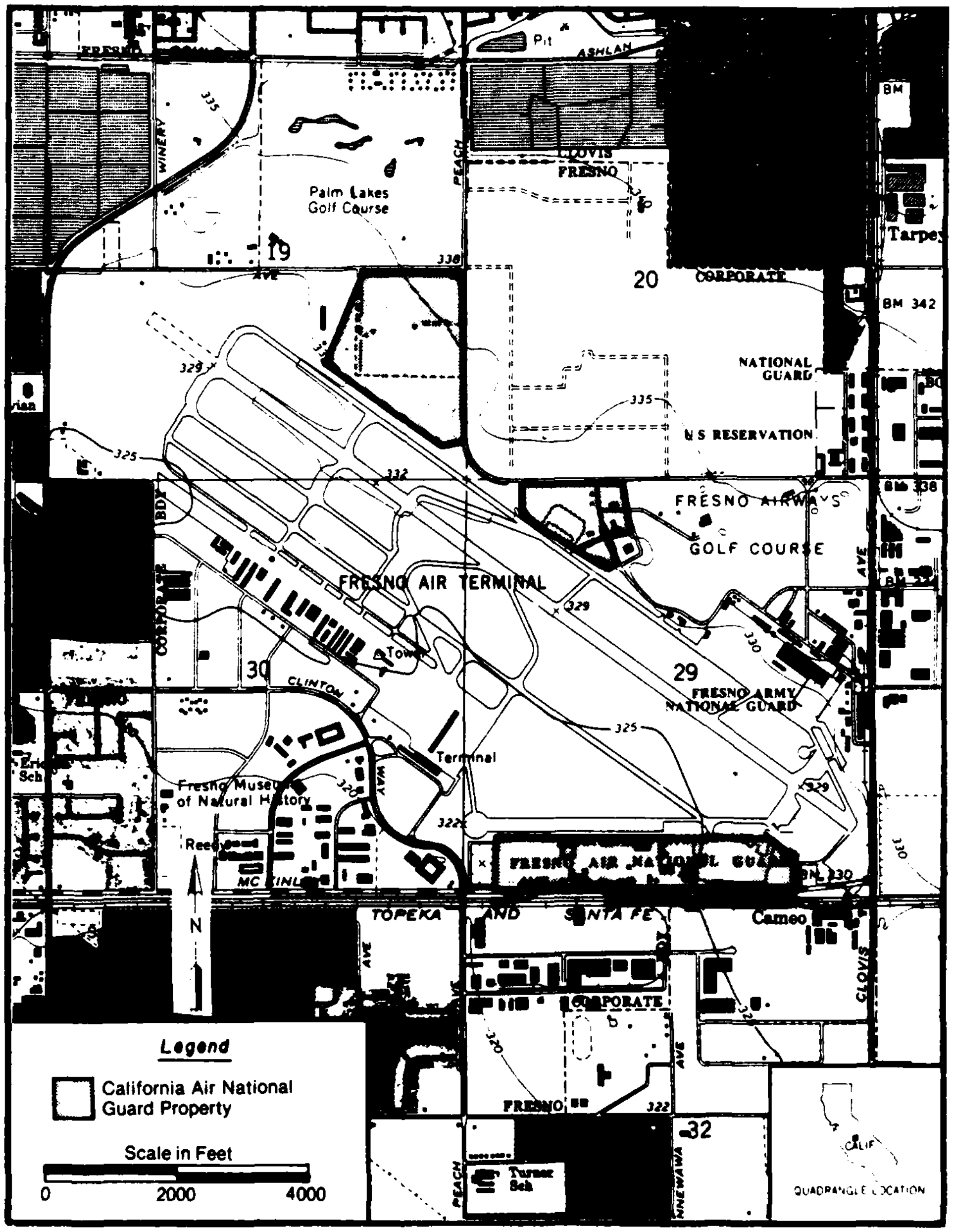
AD-A231 684

Preliminary Assessment

144th Fighter Interceptor Wing
California Air National Guard
Fresno Air Terminal
Fresno, California

Hazardous Materials Technical Center

April 1988



This report has been prepared for the National Guard Bureau, Andrews Air Force Base, Maryland by the Hazardous Materials Technical Center for the purpose of aiding in the implementation of the Air Force Installation Restoration Program.

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144th Fighter Interceptor Wing
California Air National Guard
Fresno Air Terminal, Fresno, California

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INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT

FOR

144th FIGHTER INTERCEPTOR WING
CALIFORNIA AIR NATIONAL GUARD
FRESNO AIR TERMINAL
FRESNO, CALIFORNIA

April 1988

Prepared for

National Guard Bureau
Andrews Air Force Base, Maryland 20331

Prepared by

The Hazardous Materials Technical Center
The Dynamac Building
11140 Rockville Pike
Rockville, Maryland 20852

Contract No. DLA 900-82-C-4426

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EXECUTIVE SUMMARY

A. INTRODUCTION

The Hazardous Materials Technical Center (HMTC) was retained in October 1987 to conduct the Installation Restoration Program (IRP) Preliminary Assessment (PA) of the 144th Fighter Interceptor Wing (FIW), California Air National Guard, Fresno Air Terminal, Fresno, California (hereinafter referred to as the Base), under Contract No. DLA 900-82-C-4426. The Preliminary Assessment included:

- o an onsite Base visit, including interviews with 16 past and present Base personnel conducted by HMTC personnel during 20-22 October 1987;
- o the acquisition and analysis of pertinent information and records on hazardous material use and hazardous waste generation and disposal at the Base;
- o the acquisition and analysis of available geologic, hydrologic, meteorologic, and environmental data from pertinent Federal, State, and local agencies; and
- o the identification of sites on the Base that are potentially contaminated with hazardous material/hazardous waste (HM/HW).

B. MAJOR FINDINGS

Past Base operations involved the use and disposal of material and waste that subsequently were categorized as hazardous. The major operations of the Base that have used and disposed of these materials and wastes include aircraft maintenance; aerospace ground equipment maintenance; ground vehicle maintenance; and petroleum, oil, and lubricant (POL) management and distribution. The operations involve such activities as corrosion control, nondestructive inspection, fuel cell maintenance, and engine maintenance. Waste oils, recovered fuels, spent cleaners, paint removers, thinners, strippers, and cleaning solvents were generated by these activities.

Interviews with 16 past and present Base personnel and a field survey resulted in the identification of three potential disposal and/or spill sites at the Base. The three sites are potentially contaminated with HM/HW and were assigned a Hazard Assessment Score (HAS) according to the U.S. Air Force Hazard Assessment Rating Methodology (HARM). The three potentially contaminated sites are as follows:

Site No. 1 - Old Fire Training Area (HAS-60)

From the late 1950s to early 1970s, the Base used this fire training area (FTA), which is located south of Runway 29R in the eastern portion of the airport. Substances, including JP-4, AVGAS, and used oils from several Base shops were used in periodic fire training exercises. It is estimated that approximately 500 to 1,000 gallons of flammable material was used per month throughout the FTA's history. The FTA was used primarily by the Base.

Site No. 2 - Base POL Area (HAS-50)

Since 1958, this site has been used as a Base POL area. Although there was no visual evidence of contamination, in the past, there has been periodic JP-4 spills during tank refueling. It was also mentioned, that in 1978, a 500 gallon JP-4 spill had occurred during refueling.

Site No. 3 - Storage Area at Marine Corps Sub-Leased Area (HAS-50)

During the site survey, a noticeable stain was visible adjacent to a fenceline surrounding a Marine Corps Storage Area. The stain was thought to be waste POL product which had leaked from stored 55-gallon drums. It is estimated that less than 100 gallons of material had discharged onto the surrounding ground. This area is currently being occupied by the U.S. Marine Corps and is a tenant of the ANG unit.

C. CONCLUSIONS

Information obtained through interviews with past and present Base personnel resulted in the identification of three areas on the Base that are potentially contamianted with HM/HW. Evidence from the three identified sites suggests that they may be contaminated, and that the potential for contaminant migration exists. All three of the sites were assigned a HAS according to HARM.

D. RECOMMENDATIONS

Because of the potential for contamination of soils, groundwater and surface water at the Base, and migration of contaminants, further IRP investigation at each of the scored sites is recommended in accordance with applicable regulations.

I. INTRODUCTION

A. Background

The California Air National Guard (ANG) at Fresno Air Terminal, Fresno County, Fresno, California (hereinafter referred to as the Base), supports the 144th Fighter Interceptor Wing (FIW). The unit was established in 1955. Past operations at the Base involved the use and disposal of materials and wastes that subsequently were categorized as hazardous. Consequently, the National Guard Bureau (NGB) has implemented an Installation Restoration Program (IRP), which consists of the following:

- o Preliminary Assessment (PA) - to identify past spill or disposal sites posing a potential and/or actual hazard to public health or the environment.
- o Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) - to acquire data via field studies for the confirmation and quantification of environmental contamination that may have an adverse impact on public health or the environment, and to select a remedial action through preparation of a feasibility study.
- o Research, Development, and Demonstration (RD & D) - if needed, to develop new technology for accomplishment of remediation.
- o Remedial Design/Remedial Action (RD/RA) - to prepare designs and specifications and to implement remedial action.

B. Purpose

The purpose of this IRP Preliminary Assessment is to identify and evaluate suspected problems associated with past hazardous waste handling procedures, disposal sites, and spill sites on the Base. Personnel from the Hazardous Materials Technical Center (HMTC) visited the Base, reviewed existing environmental information, analyzed the Base records concerning the use and generation of hazardous material/hazardous waste (HM/HW), and conducted interviews with past and present personnel of the Base who are familiar with past HM/HW management activities. A physical inspection was made of the suspected sites. Relevant information collected and analyzed included the Base

history, with special emphasis on the history of the shop operations and their past HM/HW management procedures; local geological, hydrological, and meteorological conditions that could affect migration of contaminants; local land use, public utilities, and zoning requirements that affect the potential for exposure to contaminants; and the ecological settings that indicate environmentally sensitive habitats or evidence of environmental stress.

C. Scope

The scope of this Preliminary Assessment is limited to the Base and includes

- o An onsite visit;
- o The acquisition of pertinent information and records on hazardous material use and hazardous waste generation and disposal practices at the Base;
- o The acquisition of available geologic, hydrologic, meteorologic, land-use and zoning, critical habitat, and utility data from various Federal, California State, and local agencies;
- o A review and analysis of all information obtained; and
- o The preparation of a report to include recommendations for further actions.

The onsite visit, and interviews with past and present personnel were conducted during the period 20-22 October 1987. The HMTC Preliminary Assessment was conducted by Mr. Raymond G. Clark, Jr., Department Manager/P.E.; Mr. Mark Johnson, Program Manager; Mr. Jeffrey D. Fletcher, Geologist; Ms. Janet Emry, Hydrogeologist; and Ms. Jacqueline Crenca, Environmental Engineer (Resumes are included as Appendix A). Individuals who assisted in the Preliminary Assessment were SMSgt. James L. Craig, Jr. (ANGSC/SG) and selected members of the 144th FIW. The Base Point of Contact (POC) was 2nd Lieutenant Bjorn A. Brinkman, Environmental Engineer (144th FIW/DEE).

D. Methodology

A flow chart of the Preliminary Assessment Methodology is presented in Figure 1. This methodology ensures a comprehensive collection and review of pertinent site-specific information and is used in the identification and assessment of potentially contaminated hazardous waste spill/disposal sites.

The Preliminary Assessment began with a site visit to the Base to identify all shop operations or activities on the Base that may have used hazardous material or generated hazardous waste. Next, an evaluation of past and present HM/HW handling procedures at the identified locations was made to determine whether environmental contamination may have occurred. The evaluation of past HM/HW handling practices was facilitated by extensive interviews with 16 past and present employees familiar with the various operating procedures at the Base. These interviews also defined the areas on the Base where waste materials, either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or released into the environment.

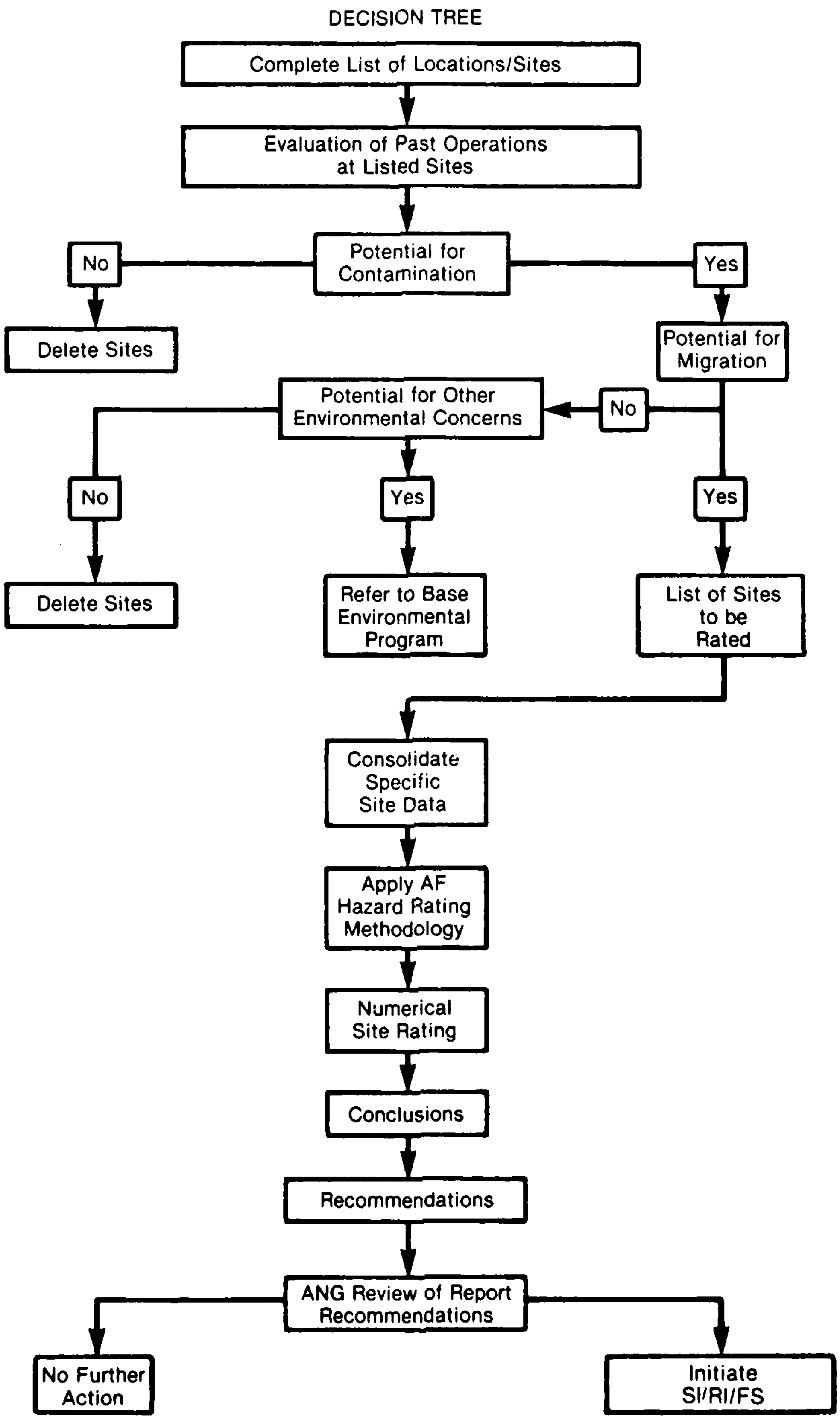
Historical records contained in the Base files were collected and reviewed to supplement the information obtained from interviews. Using this information, a list of past waste spill/disposal sites on the Base is identified for further evaluation. A general survey tour of the identified spill/disposal sites, the Base, and the surrounding area is conducted to determine the presence of visible contamination and to help assess the potential for contaminant migration. Particular attention is given to locating nearby drainage ditches, surface water bodies, residences, and wells.

Detailed geological, hydrological, meteorological, development (land use and zoning), and environmental data for the area of study was also obtained from the POC, or from appropriate Federal, State, and local agencies. A list of outside agencies contacted is in Appendix B. Following a detailed analysis of all the information obtained, areas are identified as suspect areas where HM/HW

PRELIMINARY ASSESSMENT
INSTALLATION
RESTORATION PROGRAM

Figure 1.

Preliminary Assessment Methodology Flow Chart.



disposal may have occurred. Where sufficient information is available sites are assigned a Hazard Assessment Score (HAS) using the U.S. Air Force Hazard Assessment Rating Methodology (HARM) (Appendix C). However, the absence of a HAS does not negate a recommendation for further IRP investigation, but rather indicates a lack of data. The HAS is computed from the data included in the Factor Rating Criteria (Appendix D).

II. INSTALLATION DESCRIPTION

A. Location

The 144th FIW is based at the Fresno Air Terminal, Fresno County, Fresno, California. The 144th FIW provides air defense protection to central California.

The Base occupies a total of approximately 140 acres on three separate land parcels at the Fresno Air Terminal. One of these land parcels, located in the northern portion of the airport is currently being occupied by the U.S. Marine Corps and is a tenant of the ANG unit. Figure 2 shows the current boundaries of the Base covered by this Preliminary Assessment.

Fresno Air Terminal is located in the San Joaquin Valley within the corporate boundaries of Fresno, in Fresno County, California. Property north, west, and south of the airport is predominately residential and industrial. East of the airport is primarily agricultural land. Further to the north is the city of Clovis and more agricultural land.

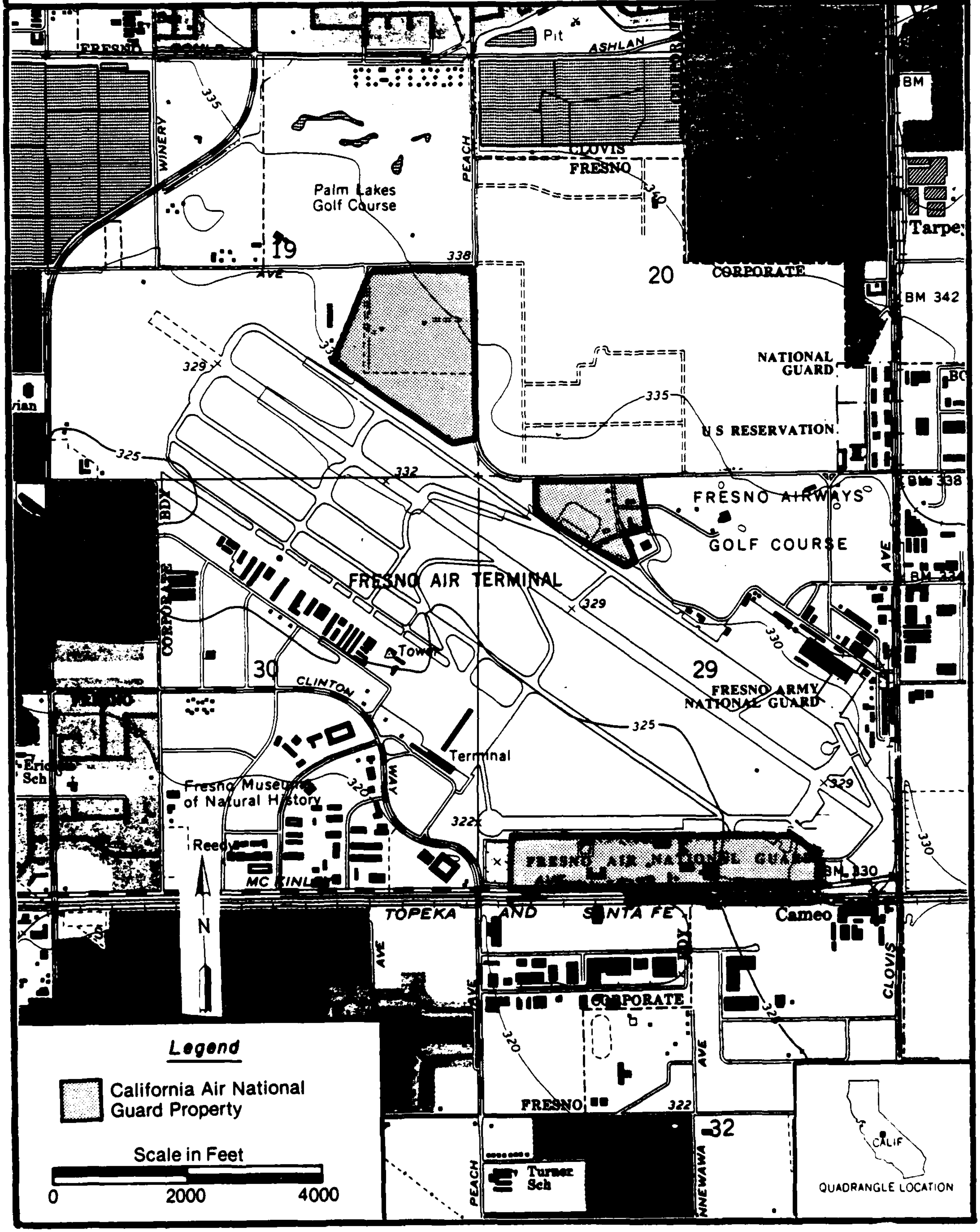
B. History

In 1955, the 144th FIW moved to the Fresno Air Terminal from Hayward, California. Prior to this move, the airport was used as an air base by the Army Air Corps. The mission of the 144th was, and still is, to recruit, administer, and train personnel and maintain combat-ready equipment for short notice mobilization.

The first mission aircraft used by the 144th was the F-51D and F-51H. Later, conversion were made to the F-86A, the F-86L, the F-102, the F-106, and currently, the F-4D Phantom. The 144th currently maintains 24 F-4Ds, 4 T-33s, and a C-131D.

Source: U.S.G.S.
Clovis, California,
7.5 minute Series
(Topographic) 1981.

Figure 2.
Location Map of California Air National Guard, Fresno Air Terminal, Fresno, California.



III. ENVIRONMENTAL SETTING

A. Meteorology

The meteorological information presented below is from local climatological data for the Fresno, California area compiled by the National Oceanic and Atmospheric Administration (NOAA). The climate of Fresno is dry and mild in winter and hot in summer. Nearly nine-tenths of the annual precipitation falls in the 6 months from November to April.

Due to clear skies during the summer and the protection of the San Joaquin Valley from marine effect, the normal daily maximum temperature reaches the high 90s during the latter part of July. The daily maximum temperature during the warmest month has ranged from 76 to 115 degrees. Low relative humidities and some wind movement substantially lower the sensible temperature during periods of high readings. Winds flow with the major axis of the San Joaquin Valley, generally from the northwest.

Although the heaviest rains recorded at Fresno for short periods have occurred in June, usually any rainfall during the summer is very light. Snow is a rare occurrence in Fresno.

The Fresno area has an average annual precipitation of 9.87 inches, based on the period from 1957 to 1986 (NOAA, 1987). By calculating net precipitation according to the method outlined in the Federal Register (47 FR 31224, 16 July 1982), a net precipitation value of -41.13 inches per year is obtained. Rainfall intensity based on 1-year frequency, 24-hour duration rainfall is .75 inches (calculated according to 47 FR 31235, 16 July 1982, Figure 8).

B. Geology

The Fresno Air Terminal is located within the Great Valley of California geomorphic province, approximately 25 miles west of the Sierra Nevada Mountain

Range. The Great Valley consists of predominately alluvial plains and fans. Area sediments were deposited by intermittent streams which overflowed their banks and moved back and forth across the region.

Surficial sediments at the Base are part of a compound alluvial fan complex, characterized by predominately poorly sorted, fine-grained silt, sand, and gravel, with local clay lenses. These unconsolidated deposits, which extended to depths of 1,000 feet or more, were deposited during the Tertiary and Cretaceous Periods. Underlying the unconsolidated surficial deposits are continental and marine sedimentary rocks deposited during the Cretaceous and Tertiary Periods. These consolidated deposits consist primarily of sandstone, siltstone, and shale.

Below the consolidated marine sedimentary rocks is the basement complex which consists of granitic Igneous rocks and compact, highly cemented Metamorphic and Sedimentary rocks (California Regional Water Control Board, 1986).

C. Hydrology

Surface Water

All surface drainage from the Fresno Air Terminal is currently collected by a system of ditches and culverts. This drainage system ultimately empties into Mill Ditch, which flows parallel to McKinley Avenue, south of the airport.

Besides Mill Ditch, there are no major surface water bodies located within the vicinity of the Fresno Air Terminal. The city of Fresno derives the majority of its municipal water from the underlying groundwater system.

Groundwater

Groundwater in the Fresno area occurs in the sand dunes, flood-basin deposits, alluvium, terrace deposits, and continental deposits. The main part of the aquifer is the alluvium and continental deposits and extends from the foothills of Sierra Nevada, westward beyond the Fresno area.

The Base receives drinking water from a well installed into an unconfined groundwater zone at a depth of 285 feet. However, a groundwater zone is also located at approximately 70 feet in depth.

Groundwater generally flows from high to low areas; at Fresno Air Terminal, the groundwater flows to the southwest.

D. Critical Habitats/Endangered or Threatened Species

According to the Sacramento Endangered Species Office of the U.S. Fish and Wildlife Service, there are no endangered or threatened species of flora or fauna within a 1-mile radius of the Base. Furthermore, there are no critical habitats, wetlands, or wilderness areas within a 1-mile radius of the Base.

IV. SITE EVALUATION

A. Activity Review

A review of Base records and interviews with past and present personnel at the Base resulted in the identification of specific operations within each activity in which the majority of industrial chemicals are handled and hazardous wastes are generated. Table 1 summarizes the major operations associated with each activity, provides estimates of the quantities of waste currently being generated by these operations, and describes the past and present disposal practices for the wastes. Based on information gathered, any operation that is not listed in Table 1 has been determined to produce negligible (less than 5 gallons/year) quantities of wastes requiring disposal.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with 16 Base personnel (Appendix B) and subsequent site inspections resulted in the identification of three waste disposal/spill sites. It was determined that all three sites are potentially contaminated with HM/HW, and have a potential for migration; therefore, they should be further evaluated. The three sites were scored using HARM (Appendix D). Figure 3 illustrates the locations of the scored sites. A copy of the completed Hazardous Assessment Rating Form is found in Appendix E. Table 2 summarizes the HAS of each scored site.

<u>Site No. 1 - Old Fire Training Area</u> (HAS-60)

An old Fire Training Area (FTA) is located in the eastern portion of the Base, just east of the aircraft parking apron. This FTA was used primarily by the Base from the late 1950s to the early 1970s. Used oils and JP-4 were the predominant substances used for fire training exercises, although it is likely that solvent products were also dumped at the site. The old FTA consists of an

Table 1. Hazardous Material/Hazardous Waste Disposal Summary: California Air National Guard, Fresno Air Terminal, Fresno, California

SHOP NAME	BUILDING NO.	WASTE MATERIAL	WASTE QUANTITY (GALLONS/YEAR)	METHODS OF TREATMENT, STORAGE AND DISPOSAL 1945 1950 1960 1970 1980 1987
Aircraft Maintenance		Acetone	100	SAN/FTA – SAN
		Engine Oil (Recip)	200	FTA
		Trichloroethane	25	DRMO
		PD-680	700	SAN/FTA – SAN – DRMO
		Strippers	240	SAN/FTA – SAN
		Hydraulic Oil	600	FTA – DRMO
		7808 Oil	600	FTA – DRMO
		JP-4	1,000	FTA – DRMO
		AVGAS	200	FTA
Aerospace Ground Equipment Maintenance (AGE)		Engine Oil	250	DRMO/CONTR – DRMO
		Hydraulic Oil	20	DRMO/CONTR – DRMO
		Strippers/Thinners	2	STORM – DRMO
		JP-4	25	FTA – DRMO/CONTR – DRMO
		PD-680	200	FTA/STORM – STORM – DRMO/CONTR – DRMO
		Turbine Oil	5	FTA/STORM – STORM – DRMO/CONTR – DRMO
		7808 Oil	100	FTA – DRMO/CONTR – DRMO
		Sulfuric Acid	10	NEUTR SAN – DRMO
Vehicle Maintenance		Engine Oil	300	GRND/FTA – CONTR – DRMO
		PD-680	50	CONTR
		Sulfuric Acid	50	SPLY – NEUTR SAN – SPLY
		JP-4	10	GRND/FTA – SPLY – SPLY
		Hydraulic Oil	20	FTA – SPLY
		Thinners	10	LNDFL – SPLY
		Ethylene Glycol	30	STORM – SPLY
Hangar Space		JP-4	50	FTA – DRMO
		PD-680	200	FTA/STORM – STORM – DRMO
		Hydraulic Oil	10	FTA – DRMO
Non-Destructive Inspection		Emulsifier	50	NEUTR SAN
		Penetrant	25	DRMO
		Trichloroethane	25	CONTR – DRMO
Photo Lab		Developer	36	NEUTR SAN
		Fixer	50	NEUTR SAN

Table I. Hazardous Material/Hazardous Waste Disposal Summary: California Air National Guard, Fresno Air Terminal, Fresno, California (Continued)

SHOP NAME	BUILDING NO.	WASTE MATERIAL	WASTE QUANTITY (GALLONS/YEAR)	METHODS OF TREATMENT, STORAGE AND DISPOSAL 1945	1950	1960	1970	1980	1987
			MARINE CORPS LEASED LAND						
Aerospace Ground Equipment Maintenance (AGE)		Motor Oil	16					DRMO	DRMO
Vehicle Maintenance		Engine Oil	2,300					DRMO	DRMO
		Sulfuric Acid	28					NEUTR SAN	NEUTR SAN
		Ethylene Glycol	4,300					DRMO	DRMO
		Lubricating Oil	115					DRMO	DRMO
		Hydraulic Oil	300					DRMO	DRMO
		Transmission Fluid	200					DRMO	DRMO
		Thinner	75					DRMO	DRMO
		Brake Fluid	100					DRMO	DRMO
		Diesel Fuel	50					DRMO	DRMO
Battery Shop		Sulfuric Acid	10					NEUTR SAN	NEUTR SAN

CONTR - Disposed of through Hazardous Waste Contractor
DRMO - Disposed of through the Defense Reutilization and Marketing Office
FTA - Burned at Fire Training Area
NEUTR SAN - Neutralized and disposed of through sanitary sewer
SAN - Disposed of in drains leading to sanitary sewer
SIL REC - Sent for silver recovery offbase
STORM - Disposed of in drains leading to storm sewer
SPLY - Turned into base supply for recovery
LNDFL - Landfilled offsite

HMTC

Source: California Air National Guard Base Map.

Figure 3.

Location of Sites at California Air National Guard, Fresno Air Terminal, Fresno, California.

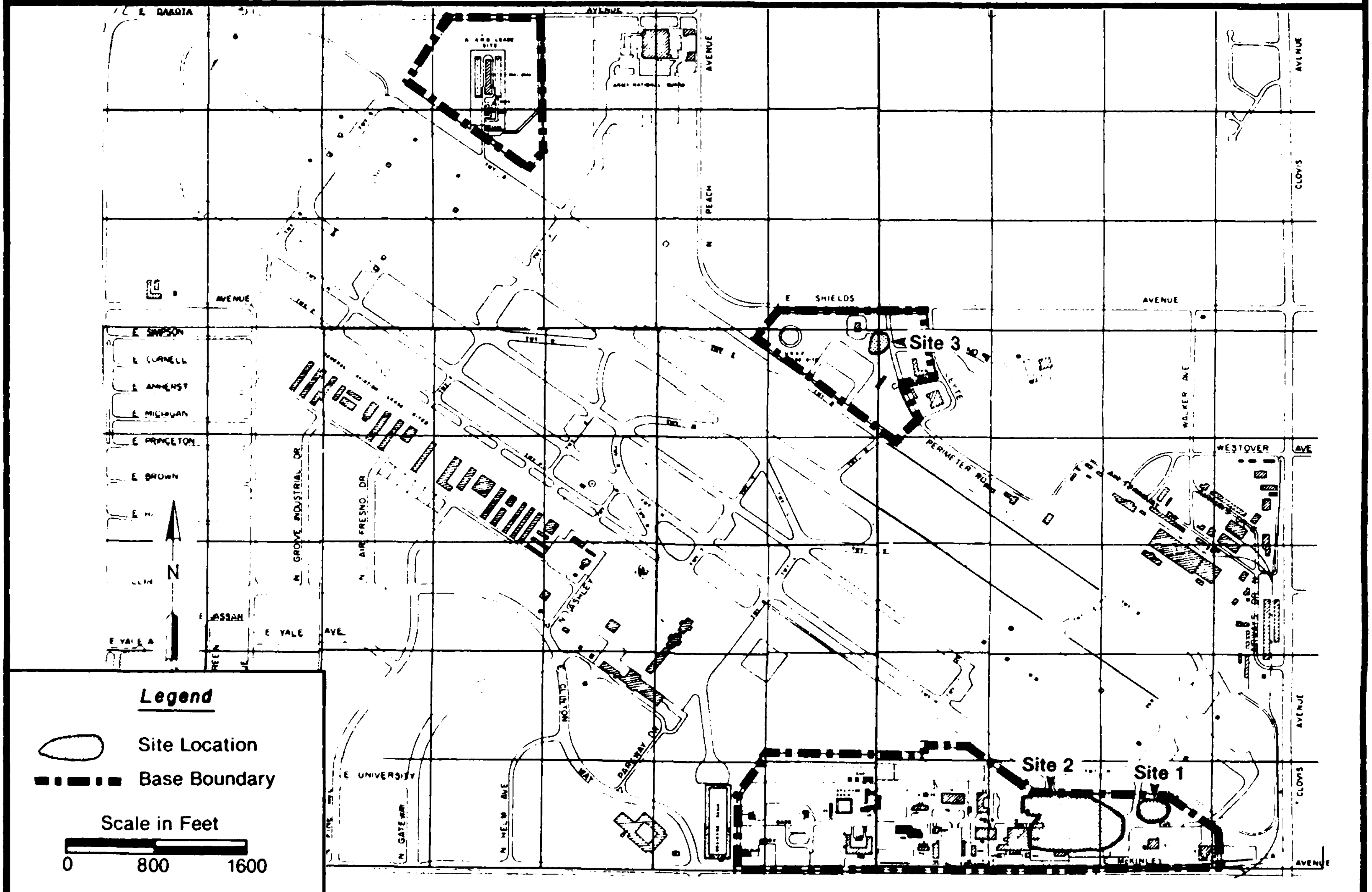


Table 2. Site Hazard Assessment Scores (as Derived from HARM): California Air National Guard, Fresno Air Terminal, Fresno, California

Site Priority	Site No.	Site Description	Receptors	Waste Characteristics	Pathway	Waste Mgmt. Practices	Overall Score
1	1	Old Fire Training Area	58	80	42	1.0	60
2	2	Base POL Area	58	50	42	1.0	50
3	3	Storage Area at Marine Corps Sub-Leased Area	58	50	42	1.0	50

open earth area, approximately 60 feet in diameter, with no containment structures or lining. According to Base personnel, after fire training exercises were discontinued, the site was covered with 3 to 4 feet of fill; thus, no visible contamination was seen during the site survey. It is estimated that approximately 500 to 1,000 gallons per month of flammable substances were used in the exercises. Also, it is assumed that the majority (at least 70 percent) of the flammable materials were destroyed during fire training exercises, leaving approximately 25,500 to 50,900 gallons to either evaporate, run off, or seep into the ground at the site. It should be noted that 70 percent is considered a conservative estimate of the amount of flammables destroyed. Given the large quantities of wastes released at the old FTA, this site was scored using HAS.

Site No. 2 - Base POL Area (HAS-50)

The Base POL area is located in the western portion of the Base, adjacent Building 117 (POL and refueling vehicle). Since 1958, the Base has maintained POL storage tanks for aircraft refueling. Of the six existing underground tanks at the site, four are 25,000 gallon JP-4 jet fuel tanks which were installed in 1958. The two remaining tanks are 30,000 gallon JP-4 tanks which were installed in 1978. According to Base personnel, in the past, there have been occasional minor spills (less than 100 gallons) of JP-4 during tank refueling. It was also mentioned that in 1978 during a scheduled tank refueling, there was a 500 gallon JP-4 spill. Given the history of small JP-4 spills, the site was scored using HAS to quantify the potential hazard presented by the site.

Site No. 3 - Storage Area at Marine Corps Sub-Leased Area (HAS-50)

This site is located at the northern edge of the Fresno Air Terminal within a parcel of land sub-leased by the U.S. Marine Corps. During the site investigations, the HMTC team discovered a POL stain adjacent to a fenceline surrounding a POL storage area. The stained area, which was approximately 12 feet by 1 foot, was apparently the result of dripping 55-gallon POL drums, lo-

cated within the fenced storage area. It is assumed that less than 100 gallons of POL product was released from the drums. Because visual oil stains provided evidence that hazardous material had been spilled, a HAS was applied to quantify the relative potential hazard posed by this site. An updated hazardous waste storage area is currently under construction by the Marine Corps adjacent to the current storage area.

V. CONCLUSIONS

Information obtained through interviews with 16 past and present Base personnel, review of Base records, and field observations have resulted in the identification of three potentially contaminated disposal and/or spill sites on Base property. These sites consist of the following:

- o Site No. 1 - Old Fire Training Area (HAS-60)
- o Site No. 2 - Base POL Area (HAS-50)
- o Site No. 3 - Storage Area at Marine Corps Sub-Leased Area (HAS-50)

Each of these sites is potentially contaminated with HM/HW and each exhibit the potential for contaminant migration to groundwater and surface water. Therefore, these sites were assigned as HAS according to HARM.

VI. RECOMMENDATIONS

Because of the potential for soils, groundwater, and surface water contamination at the Base, initial investigative stages of the IRP are recommended for all of the scored sites identified at the Base. The following recommendations are made to ascertain if soil or groundwater at the three scored sites have been contaminated, and to confirm or refute that contaminants are migrating.

Site No. 1 - Old Fire Training Area

Further IRP investigation at this site is recommended in accordance with applicable regulations.

Site No. 2 - Base POL Area

Further IRP investigation at this site is recommended in accordance with applicable regulations.

Site No. 3 - Storage Area at Marine Corps Sub-Leased Area

Further IRP investigation at this site is recommended in accordance with applicable regulations.

GLOSSARY OF TERMS

AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

CONTAMINANT - As defined by Section 101(f)(33) of SARA shall include, but not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquified natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CRETACEOUS - The final period of the Mesozoic era (after the Jurassic and before the the Tertiary period of the Cenozoic era) thought to have covered the span of time between 135 and 65 million years ago; also the corresponding system of the rocks.

CRITICAL HABITAT - The native environment of an animal or plant which, due either to the uniqueness of the organism or the sensitivity of the environment, is susceptible to adverse reactions to environmental changes such as may be induced by chemical contaminants.

DOWNGRADIENT - A direction that is hydraulically downslope; the direction in which groundwater flows.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the secretary to constitute a pest whose protection would present an overwhelming and overriding risk to man.

GROUNDWATER - Refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, 11 December 1981).

HAS - Hazard Assessment Score - The score developed by utilizing the Hazardous Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

a. Cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness; or

b. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed.

MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil and air).

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

SOIL PERMEABILITY - The characteristic of the soil that enables water to move downward through the profile. Permeability is measured as to the number of inches per hour that water moves downward through the saturated soil.

Terms describing permeability are:

Very Slow	- less than 0.06 inches per hour (less than 4.2×10^{-5} cm/sec)
Slow	- 0.06 to 0.20 inches per hour (4.2×10^{-5} to 1.4×10^{-4} cm/sec)
Moderately Slow	- 0.2 to 0.6 inches per hour (1.4×10^{-4} cm/sec)
Moderate	- 0.6 to 2.0 inches per hour ($4.2 \times 10^{-4} \times 10^{-3}$ cm/sec)
Moderately Rapid	- 2.0 to 6.0 inches per hour (1.4×10^{-3} to 4.2×10^{-3} cm/sec)
Rapid	- 6.0 to 20 inches per hour (4.2×10^{-3} to 1.4×10^{-2} cm/sec)
Very Rapid	- more than 20 inches per hour (more than 1.4×10^{-2} cm/sec)

(Reference: U.S.D.A. Soil Survey)

SURFACE WATER - All water exposed at the ground surfaces including streams, rivers, ponds, and lakes.

TERTIARY - The first period of the Cenozoic era (after the Cretaceous of the Mesozoic era and before the Quaternary), thought to have covered the span of time between 65 and two to three million years ago.

THREATENED SPECIES - Any species which is likely to become an endangered species within the forseeable future throughout all or a significant portion of its range.

TOPOGRAPHY - The general conformation of a land surface, including its relief and the position of its natural and manmade features.

UPGRADIENT - A direction that is hydraulically upslope.

WATER TABLE - As used in this report, the water table is the surface below which all the openings or voids in the ground are filled with water. It is the surface at which water stands in shallow wells, or would stand if a well were drilled.

WETLANDS - An area subject to permanent or prolonged inundation or saturation that exhibits plant communities adapted to this environment.

WILDERNESS AREA - An area unaffected by anthropogenic activities and deemed worthy of special attention to maintain its natural condition.

BIBLIOGRAPHY

1. Aquifer Determination Pursuant to G 1424(e) of the Safe Drinking Water Act, Fresno County, California, EPA Region IX, January 1977.

2. California Air National Guard, On Base Disaster Preparedness Map, Fresno California, November, 1986.

3. California Regional Water Quality Control Board, Fresno, California, Hydrological and Geological Reports of the Fresno, California Area.

4. National Oil and Hazardous Substances Contingency Plan, Federal Register (47 FR 31235), July 16, 1982.

5. National Oil and Hazardous Substances Contingency Plan, Federal Register (47 FR 31235), July 16, 1982.

6. United States Geological Survey, Clovis Quadrangle, California, 7.5 Minute Series (Topographic), 1981.

APPENDIX A

Resumes of Preliminary Assessment Team Members

RAYMOND G. CLARK, JR.

EDUCATION

Completed graduate engineering courses, George Washington University, 1957
B.S., mechanical engineering, University of Maryland, 1949

SPECIALIZED TRAINING

Grad. European Command Military Assistance School, Stuttgart, 1969
Grad. Army Psychological Warfare School, Fort Bragg, 1963
Grad. Sanz School of Languages, D.C., 1963
Grad. DOD Military Assistance Institute, Arlington, 1963
Grad. Defense Procurement Management Course, Fort Lee, 1960
Grad. Engineer Officer's Advanced Course, Fort Belvoir, 1958

CERTIFICATIONS

Registered Professional Engineer: Kentucky (#4341); Virginia (#8303); Florida (#36228)

EXPERIENCE

Twenty-nine years of experience in engineering design, planning and management including construction and construction management, environmental, operations and maintenance, repair and utilities, research and development, electrical, mechanical, master planning and city management. Over six years' logistical experience including planning and programming of military assistance materiel and training for foreign countries, serving as liaison with American private industry, and directing materiel storage activities in an overseas area. Over two years' experience as an engineering instructor. Extensive experience in personnel management, cost reduction programs, and systems improvement.

EMPLOYMENT

Dynamac Corporation (1986-present): Program Manager

Responsible for activities relating to Phases I, II and IV of the U.S. Air Force Installation Restoration Program including records search, review and evaluation of previous studies; preparation of statements of work, feasibility studies; preparation of remedial action plans, designs and specifications; review of said studies/plans to ensure that they are in conformance with requirements; review of environmental studies and reports; and preparation of Air Force Installation Restoration Program Management Guidance.

Howard Needles Tammen & Bergendoff (HNTB) (1981-1986): Manager

Responsible, as Project Manager, for: design of a new concourse complex at Miami International Airport to include terminal building, roadway system, aircraft apron, drainage channel relocation, satellite building with underground pedestrian tunnel, and associated underground utility corridors, to include subsurface aircraft fueling systems, with an estimated construction cost of $163 million; a cargo vehicle tunnel under the crosswind runway with an estimated construction cost of $15 million; design and construction of two large corporate jet aircraft hangars; and for the hydrocarbon recovery program to include investigation, analysis, design of recovery systems, monitoring of recovery systems, and planning and design of residual recovery systems utilizing biodegradation. Participated, as sub-consultant, in Air Force IRP seminar.

HNTB (1979-1981): Airport Engineer

Responsibilities included development of master plan for Iowa Air National Guard base; project initiation assistance for a new regional airport in Florida; engineering assistance for new facilities design and construction for Maryland Air National Guard; master plan for city maintenance facilities, Orlando, Florida; in-country master plan and preliminary engineering project management for Madrid, Spain, International Airport; and project management of master plan for Whiting Naval Air Station and outlying fields in Florida.

HNTB (1974-1979): Design Engineer

Responsibilities included development of feasibility and site selection studies for reliever airports in Cleveland and Atlanta; site selection and facilities requirements for the Office of Aeronautical Charting and Cartography, NOAA; and onsite mechanical and electrical engineering design for terminal improvements at Baltimore-Washington International Airport, Maryland.

HNTB (1972-1974): Airport Engineer

Responsible for development of portions of the master plan and preliminary engineering for a new international airport for Lisbon, Portugal, estimated to cost $250 million.

Self-employed (1971-1972): Private Consultant

Responsible for engineering planning and installation of a production line for multimillion-dollar contract in Madrid, Spain, to fabricate transmissions and differentials for U.S. Army vehicles.

U.S. Army, Corps of Engineers (1969-1971): Chief, Materiel & Programs

Directed materiel planning and military training programs of military assistance to the Spanish Army. Controlled arrival and acceptance of materiel by host government. Served as liaison/advisor to American industry interested

in conducting business with Spanish government. Was Engineer Advisor to Spanish Army Construction, Armament and Combat Engineers, also the Engineer Academy and Engineer School of Application.

Corps of Engineers (1968-1969): Chief, R&D Branch, OCE

Directed office responsible to Chief of Engineers for research and development. Developed research studies in new concepts of bridging, new explosives, family of construction equipment, night vision equipment, expedient airfield surfacing, expedient aircraft fueling systems, water purification equipment and policies, prefabricated buildings, etc. Achieved Department of Army acceptance for development and testing of new floating bridge. Participated in high-level Department Committee charged with development of a Tactical Gap Crossing Capability Model.

Corps of Engineers (1967-1968): Division Engineer

Facilities engineer in Korea. Was fully responsible for management and maintenance of 96 compounds within 245 square miles including 6,000+ buildings, 1 million linear feet of electrical distribution lines, 18 water purification and distribution systems, sanitary sewage disposal systems, roads, bridges, and fire protection facilities with real property value of more than $256 million. Planned and developed the first five-year master plan for this area. Administered $12 million budget and $2 million engineer supply operation. Was in responsible charge of over 500 persons. Developed and obtained approval for additional projects worth $9 million for essential maintenance and repair. Directed cost reduction programs that produced more than $500,000 savings to the United States in the first year.

Corps of Engineers (1963-1967): Engineer Advisor

Engineer and aviation advisor to the Spanish Army. Developed major modernization program for Spanish Army Engineers, including programming of modern engineer and mobile maintenance equipment. Directed U.S. portion of construction, testing and acceptance of six powder plants, one shell loading facility, an Engineer School of Application, and depot rebuild facilities for engineer, artillery, and armor equipment. Planned and developed organization of a helicopter battalion for the Spanish Army. Responsible for sales, delivery, assembly and testing of 12 new helicopters in country. Provided U.S. assistance to unit until self-sufficiency was achieved. Was U.S. advisor to Engineer Academy, School of Application and Polytechnic Institute.

Corps of Engineers (1960-1963): Deputy District Engineer

Responsible for planning and development of extensive construction projects in the Ohio River Basin for flood control and canalization, including dam, lock, bridge, and building construction, highway relocation, watershed studies, real estate acquisitions and dispositions. Was contracting officer for more than $75

million of projects per year. Supervised approximately 1,300 personnel, including 300 engineers. Planned and directed cost reduction programs amounting to more than $200,000 per year. Programmed and controlled development of a modern radio and control net in a four-state area.

Corps of Engineers (1959-1960): Area Engineer

Directed construction of a large airfield in Ohio as Contracting Officer's representative. Assured that all construction (runway, steam power plant, fuel transfer and loading facilities, utilities, buildings, etc.) complied with terms of plans and specifications. Was onsite liaison between Air Force and contractors.

Corps of Engineers (1958-1959): Chief, Supply Branch

Managed engineer supply yard containing over $21 million construction supplies and engineer equipment. Directed in-storage maintenance, processing and deprocessing of equipment. Achieved complete survey of items on hand, a new locator system and complete rewarehousing, resulting in approximately $159,000 savings in the first year.

Corps of Engineers (1957-1958): Student

U.S. Army Engineer School, Engineer Officer's Advanced Course.

Corps of Engineers (1954-1957): Engineer Manager

Managed engineer construction projects and was assigned to staff and faculty of the Engineer School. Was in charge of instruction on engineer equipment utilization, management and maintenance. Directed Electronic Section of the school. Coordinated preparation of five-year master plan for the Department of Mechanical and Technical Equipment.

Corps of Engineers (1949-1954): Engineer Commander

Positions of minor but increasing importance and responsibility in engineering management, communications, demolitions, construction administration and logistics.

PROFESSIONAL AFFILIATIONS

Member, National Society of Professional Engineers
Fellow, Society of American Military Engineers
Member, American Society of Civil Engineers
Member, Virginia Engineering Society
Member, Project Management Institute

HARDWARE

IBM PC

SOFTWARE

Lotus 1-2-3, D Base III Plus, Framework, Project Scheduler 5000, Harvard Project Manager, Volkswriter, Microsoft Project

MARK D. JOHNSON

EDUCATION

B.S., geology, James Madison University, 1980

EXPERIENCE

Seven years' technical experience including geologic mapping, subsurface investigations, foundation inspections, groundwater monitoring, pumping and observation well installation, geotechnical instrumentation, groundwater assessment, preparation of Air Force Installation Restoration Program Guidance and preparation of statements of work for the Air Force and the Air National Guard.

EMPLOYMENT

Dynamac Corporation (1984-present): Staff Scientist/Geologist

Primarily responsible for preparing statements of work for Phase IV-A of the Air Force's Installation Restoration Program, statements of work for Phase II and Phase IV-A of the Air National Guard's Installation Restoration Program, and assessing groundwater of hazardous waste disposal/spill sites on military installations for the purpose of determining rates and extents of contaminant migration and for developing site investigations, remedial investigations and identifying remedial actions. Prepared management guidance document for the Air Force's Installation Restoration Program.

Bechtel Associates Professional Corporation (1981-1984): Geologist

Performed the following duties in conjunction with major civil engineering projects including subways, nuclear power plants and buildings: prepared geologic maps of surface and subsurface facilities in rock and soil including tunnels, foundations and vaults; assessed groundwater conditions in connection with construction activities and groundwater control systems; monitored the installation of permanent and temporary dewatering systems and observation wells; monitored surface and subsurface settlement of tunnels; and participated in subsurface investigations.

Schnabel Engineering Associates (1981): Geologist

Inspected foundations and backfill placement.

PROFESSIONAL AFFILIATIONS

Association of Engineering Geologists
National Water Well Association/Association of Ground Water Scientists and Engineers
British Tunneling Society

JEFFREY D. FLETCHER

EDUCATION

B.S., geology, Millersville University, 1984

EXPERIENCE

Technical and field experience includes geologic mapping, water well site location, and construction of water table maps. Expertise in hazardous waste management including site evaluations and preparation of records searches for the Phase I portion of the Installation Restoration Program for the Air Force and the Phase II Preliminary Assessment of the Hazardous Waste Site Investigation Program for the Federal Bureau of Prisons. Experience also includes principal investigator in charge of a Hazardous Waste Survey/Historical Records Search for the U.S. Coast Guard.

EMPLOYMENT

Dynamac Corporation (1986-present): Staff Scientist/Geologist

Responsibilities include site evaluations and preparation of records searches for Phase I of the Installation Restoration Program for the Air National Guard and Phase II - Preliminary Assessments of the Hazardous Waste Site Investigation Program for the Federal Bureau of Prisons. Efforts include assessment of hazardous waste disposal/spill sites for the purpose of determining rates and extents of contaminant migration and for identifying remedial actions.

Fletcher-Lowright and Assoc., Consulting Geologists (1984-1985): Geohydrology Assistant

Primary duties included site location of water wells, analysis of well yield data through the use of computers, and construction of water table maps.

JACQUELINE A. CRENCA

EDUCATION

B.S., environmental engineering, Pennsylvania State University, 1983

SPECIALIZED TRAINING

Hazardous Waste Site Investigation Health and Safety Training Course

CERTIFICATION

Engineer-in-Training, Pennsylvania, 1983

EXPERIENCE

Four years of technical experience in hazardous and solid waste management, including CERCLA remedial investigations and feasibility studies, RCRA Part B permit application preparation, and solid and hazardous waste land disposal facility design. Performed hydrogeologic, environmental and regulatory analyses for several solid and hazardous waste facilities. Prepared cost estimates, designs and specifications, and operations and maintenance guidelines. Also familiar with site investigations, sampling, monitoring, and personal protective equipment usage.

EMPLOYMENT

Dynamac Corporation (1986-present): Environmental Engineer

Primarily responsible for preparing statements of work for Phases II and IV-A of the Air Force's Installation Restoration Program. Duties include site reconnaissance, background data evaluation, assessment of extent of contamination, and specification of activities required for site investigations and development of remedial actions. Also reviews remedial action plans and cleanup designs for technical and regulatory consistency.

Black & Veatch, Engineers-Architects (1983-1986): Environmental Engineer

Served as environmental engineer for the performance of two Remedial Investigation/Feasibility Study (RI/FS) projects for the New Jersey Department of Environmental Protection. These RI/FS projects addressed the Florence Land Recontouring Landfill in Burlington County and the Sayreville Landfill in Middlesex County. Specific responsibilities included background data collection and assimilation, and preparation of site-specific quality assurance, field sampling, and health and safety plans. In addition, assisted in the preparation

of a Background Investigation Study, a Focus Feasibility Study for initial remedial measures, a Remedial Investigation Report, and a Feasibility Study Report. Also served as a liaison during remedial investigation activities, and has evaluated chemical analysis results and institutional requirements for alternative evaluation.

Served as an environmental engineer on the Hawkins Point Hazardous Waste Landfill project for the Maryland Environmental Service and Allied Chemicals. Main responsibilities included RCRA Part B Permit Application and Design Documentation preparation and review, leachate collection system design and surface water runoff analysis. Prepared construction cost-estimates and specifications, responses to Notices-of-Deficiency, an Operations & Maintenance Manual, an NPDES Permit Application, a Continuing Releases Assessment, and an Exposure Information Report. Contributed to the preparation of an environmental assessment and a hydrogeologic assessment for the facility.

In addition, served as an environmental engineer for the County of Loudoun, Virginia Sanitary Landfill project. Duties on the project included development of intermediate and final site grading and waste cell configurations, design of the leachate collection system, preparation of the final design report, and interpretation of groundwater monitoring results. Contributed to the preparation of an RFP for a landfill gas recovery system for the City of Virginia Beach, Virginia Landfill No. 2, and the design of a remedial closure system for Virginia Beach, Virginia Landfill No. 1. Also contributed to a study of bentonite landfill liners prepared for the Exxon Minerals Company, and the design of a stormwater drainage and sewer system for the Turkey Branch project for Montgomery County, Maryland.

<u>U.S. Environmental Protection Agency, Office of Solid Waste (1983)</u>: Environmental Engineer

Worked on several projects involving revision to the Resource Conservation and Recovery Act (RCRA); specifically, reviewed public comment and began revising the proposed amendment to the definition of solid waste. Initiated the revision of management standards for recycled hazardous waste. Also participated in the development and performance of the National Small Quantity Hazardous Waste Generator Study, and analyzed several state-initiated small quantity generator studies.

PROFESSIONAL AFFILIATIONS

Hazardous Materials Control Research Institute
Governmental Refuse Collection and Disposal Association

JANET SALYER EMRY

EDUCATION

M.S., geology, Old Dominion University, 1987
B.S. (cum laude), geology, James Madison University, 1983

EXPERIENCE

Three years' technical experience in the fields of hydrogeology and environmental science, including drilling and placement of wells, well monitoring, aquifer testing, determination of hydraulic properties, computer modeling of aquifer systems, and field and laboratory soils analysis.

EMPLOYMENT

Dynamac Corporation (1987-present): Staff Scientist/Hydrogeologist

Responsibilities include Preliminary Assessments, Site Investigations, Remedial Investigations, Feasibility Studies, and Emergency Responses to include providing geological and hydrological assessments of hazardous waste disposal/spill sites, determination of rates and extents of contaminant migration, and computer modeling of groundwater flow and contaminant transport. Projects are for the U.S. Air Force and Air National Guard Installation Restoration Program.

Froehling and Robertson, Inc. (1986-1987): Geologist/Engineering Technician

Performed both field and laboratory engineering soils tests.

The Nature Conservancy (1985-1986): Hydrogeologist

Investigated groundwater geology of the Nature Conservancy's Nags Head Woods Ecological Preserve in Dare County, North Carolina. Study included installing wells, monitoring water table levels, determination of hydraulic parameters through a pumping test, stratigraphic test borings, and computer modeling.

Old Dominion University (1983-1985): Teaching Assistant, Department of Geological Sciences

Taught laboratory classes in Earth Science and Historical Geology.

PROFESSIONAL AFFILIATIONS

Geological Society of America
National Water Well Association/Association of Ground Water Scientists and Engineers

PUBLICATION

Impact of Municipal Pumpage Upon a Barrier Island Water Table, Nags Head and Kill Devil Hills, North Carolina. In: Abstracts with Programs, Geological Society of America, Vol. 19, No. 2, February 1987.

APPENDIX B

Outside Agency Contact List

OUTSIDE AGENCY CONTACT LIST

1. National Oceanic and Atmospheric Administration
   6001 Executive Boulevard
   Rockville, Maryland 21082

2. United States Geological Survey
   12201 Sunrise Valley Drive
   Reston, Virginia 22092

3. California Regional Water Quality Control Board
   Central Valley Region
   3614 East Ashlan Avenue
   Fresno, California 93726

4. United States Department of the Interior
   Fish and Wildlife Service
   2800 Cottage Way, Room E-1823
   Sacramento, California 95825

APPENDIX C

USAF Hazard Assessment Rating Methodology

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The Department of Defense (DoD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DoD facilities. One of the actions required under this program is to:

> develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Preliminary Assessment phase of its Installation Restoration Program (IRP).

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-on site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD program needs.

The model uses data readily obtained during the Preliminary Assessment portion of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1 of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: possible receptors of the contamination, the waste and its characteristics, the potential pathways for contaminant migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1,000 feet of the site, and the distance between the site the the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 x factor score subtotal/maximum score subtotal).

The waste characteristics category is scored in three stages. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways: surface-water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment can be reuuced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels: 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence or economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records

Logic based on the knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200° F	Flash point at 140° F to 200° F	Flash point at 80° F to 140° F	Flash point less than 80° F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
	L	C	M
80	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:

For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

- o Wastes with the same hazard rating can be added.
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (including drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall (Number of thunderstorms)	<1.0 inch (0-5)	1.0 to 2.0 inches (6-35)	2.1 to 3.0 inches (36-49)	>3.0 inches (>50)	8

B-2 Potential for Flooding

Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Ground-Water Contamination

Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	8
Soil permeability	Greater than 50% clay ($<10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($>10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8

B-3 Potential for Ground-Water Contamination--Continued

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-6-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX D

USAF Hazard Assessment Rating Methodology

Factor Rating Criteria

144th Fighter Interceptor Wing
California Air National Guard
Fresno Air Terminal
Fresno, California

USAF HAZARD ASSESSMENT RATING METHODOLOGY
FACTOR RATING CRITERIA

1. RECEPTORS

Population within 1,000 feet of site:	Over 100
Distance to nearest well:	
Site No. 1	1,200 feet
Site No. 2	1,000 feet
Site No. 3	2,800 feet
Land use/zoning within 1-mile radius:	Residential
Distance to Base boundary:	
Site No. 1	Less than 100 feet
Site No. 2	Less than 100 feet
Site No. 3	Less than 100 feet
Critical environments within 1 mile:	Not a critical environment
Water Quality of nearest surface water body:	Agricultural or industrial use
Groundwater use of uppermost aquifer:	Limited use for drinking water
Population served by surface water supply within 3 miles downstream of site:	None
Population served by groundwater supply within 3 miles of site:	More than 1,000

2. WASTE CHARACTERISTICS

Quantity

Site No. 1	Over 5,000 gallons
Site No. 2	Less than 1,000 gallons
Site No. 3	Less than 500 gallons

USAF HAZARD ASSESSMENT RATING METHODOLOGY
FACTOR RATING CRITERIA (Continued)

2. WASTE CHARACTERISTICS (Continued)

Confidence Level

Site No. 1	Confirmed
Site No. 2	Confirmed
Site No. 3	Confirmed

Hazard Rating

Site No. 1	Medium
Site No. 2	Medium
Site No. 3	Medium

3. PATHWAYS

Surface Water Migration

Distance to nearest surface water:

Site No. 1	Approximately 500 feet
Site No. 2	Approximately 450 feet
Site No. 3	Approximately 500 feet

Net precipitation:	-41.13 inches
Surface erosion	Slight
Surface permeability:	1×10^{-2} to 1×10^{-4} cm/sec
Rainfall intensity:	.75 inches
Flooding:	Beyond 100-year flood-plain

Groundwater Migration

Depth to groundwater:	11 to 50 feet
Net precipitation:	-41.13 inches

144th Fighter Interceptor Wing
California Air National Guard
Fresno Air Terminal
Fresno, California

USAF HAZARD ASSESSMENT RATING METHODOLOGY
FACTOR RATING CRITERIA (Continued)

3. PATHWAYS (Continued)

Groundwater Migration (Continued)

Soil permeability:	1×10^{-2} to 1×10^{-4} cm/sec
Subsurface flow:	Occasionally submerged
Direct access to groundwater:	Low risk

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE	SITE NO. 1 - OLD FIRE TRAINING AREA
LOCATION	FRESNO AIR TERMINAL, FRESNO, CALIFORNIA
DATE OF OPERATION/OCCURRENCE	LATE 1950'S TO EARLY 1970'S
OWNER/OPERATOR	CALIFORNIA AIR NATIONAL GUARD
COMMENTS/DESCRIPTION	PREVIOUS SITE DESIGNATED FOR FIRE TRAINING EXERCISES
RATED BY	HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	3	10	30	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	3	3	9	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	0	6	0	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	3	6	18	18
		SUBTOTALS		105	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 58

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (L)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (M)

FACTOR SUBSCORE A (80)
(FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX)

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(80)(1) = (80)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(80)(1) = (80)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (LESS THEN 80) EXISTS, PROCEED TO B

(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	0	8	0	24
SUBTOTALS				38	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					35

2. FLOODING

RATING FACTOR		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE
FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE
DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	1	8	8	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(42)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(58)
WASTE CHARACTERISTICS	(80)
PATHWAYS	(42)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(60)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR =	FINAL SCORE
(60)	(1)	60

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE	SITE NO. 2 - BASE POL AREA
LOCATION	FRESNO AIR TERMINAL, FRESNO, CALIFORNIA
DATE OF OPERATION/OCCURRENCE	1958 TO PRESENT
OWNER/OPERATOR	CALIFORNIA AIR NATIONAL GUARD
COMMENTS/DESCRIPTION	STORAGE AND REFUELING AREA FOR JET FUEL
RATED BY	HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	3	10	30	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	3	3	9	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	0	6	0	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	3	6	18	18
		SUBTOTALS		105	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 58

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (M)

FACTOR SUBSCORE A (50)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(50)(1) = (50)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(50)(1) = (50)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (LESS THEN 80) EXISTS, PROCEED TO B

(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	0	8	0	24
SUBTOTALS				38	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					35

RATING FACTOR		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE
2. FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE
DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	1	8	8	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(42)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(58)
WASTE CHARACTERISTICS	(50)
PATHWAYS	(42)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(50)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(50)	(1)	=	50

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE	SITE NO. 3 - STORAGE AREA AT MARINE CORPS SUB-LEASED AREA
LOCATION	FRESNO AIR TERMINAL, FRESNO, CALIFORNIA
DATE OF OPERATION/OCCURRENCE	
OWNER/OPERATOR	CALIFORNIA AIR NATIONAL GUARD
COMMENTS/DESCRIPTION	STORAGE AREA FOR MARINE CORPS ON ANG PROPERTY
RATED BY	HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	3	10	30	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	3	3	9	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	0	6	0	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	0	6	0	18
GROUND WATER	:	3	6	18	18
		SUBTOTALS		105	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 58

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (M)

FACTOR SUBSCORE A (50)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(50)(1) = (50)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(50)(1) = (50)

III. PATHWAY

RATING FACTOR		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE

A. IF THERE IS EVIDENCE OF MIGRATION OF HAZARDOUS CONTAMINANTS, ASSIGN MAXIMUM FACTOR SUBSCORE OF (100 POINTS FOR DIRECT EVIDENCE) OR (80 POINTS FOR INDIRECT EVIDENCE). IF DIRECT EVIDENCE (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (LESS THEN 80) EXISTS, PROCEED TO B

(0)

B. RATE THE MIGRATION POTENTIAL FOR 3 POTENTIAL PATHWAYS: SURFACE WATER MIGRATION, FLOODING, AND GROUND-WATER MIGRATION. SELECT THE HIGHEST RATING, AND PROCEED TO C.

1. SURFACE WATER MIGRATION

RATING FACTOR		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	3	8	24	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	1	6	6	18
RAINFALL INTENSITY	:	0	8	0	24
SUBTOTALS				38	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					35

2. FLOODING

		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE
FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MLTPLR	FACTOR SCORE	MAX. POSSIBLE SCORE
DEPTH TO GROUND WATER	:	2	8	16	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	2	8	16	24
SUBSURFACE FLOWS	:	1	8	8	24
DIRECT ACCESS TO GROUND WATER	:	1	8	8	24
SUBTOTALS				48	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					42

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.

(42)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(58)
WASTE CHARACTERISTICS	(50)
PATHWAYS	(42)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(50)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR	FINAL SCORE
(50)(	1	50